MCMURRAY

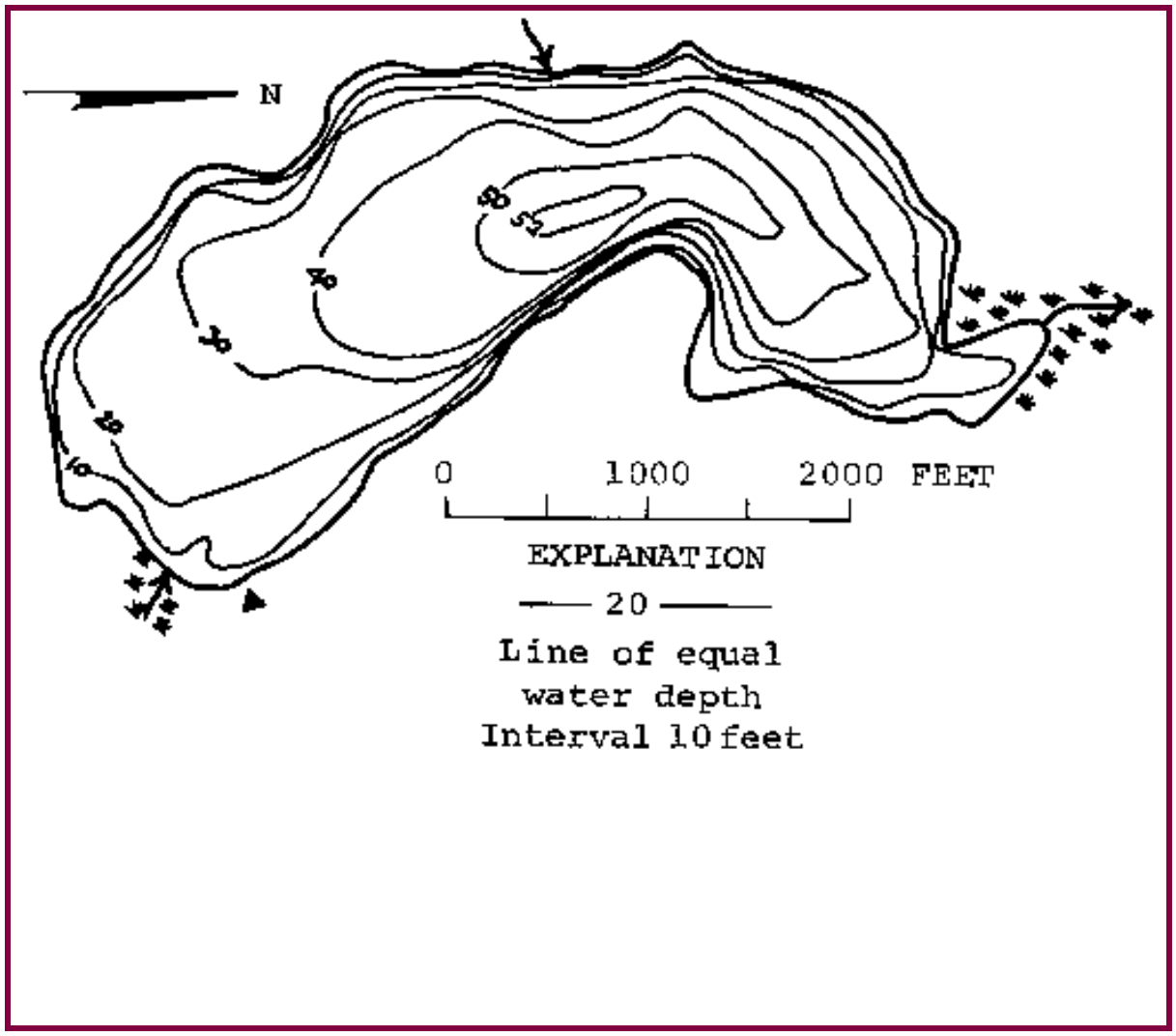
SKAGIT County

Lake ID: *MCMSK1*

Ecoregion: 2

Lake McMurray is a largely forested lake located 7.5 miles southeast from Mount Vernon. It is fed by two tributaries and drains via Lake Creek to Big Lake.

Area (acres)	*Maximum Depth (ft)*	*Mean Depth (ft)*	*Drainage (sq mi)*	
160	52	29	3	
Volume (ac-ft)	***Shoreline (miles)***	***Altitude (ft abv msl)***	***Latitude***	***Longitude***
4500	2.65	158	48 19 28.	122 13 22.



Station Information

MCMSK1

Primary Station	Station # 1	latitude: 48 19 00.4	longitude: 122 13 36.8
	Description: Deep part of lake, about 750 feet east of inlet on western shore.		

Trophic State Assessment for 1999

MCMURRAY

Analyst: Sarah O'Neal

TSI_Secchi:	[a] 38	N
TSI_Phos:	48	
TSI_Chl:	45	
Narrative TSI:	[b] M	

Lake McMurray is a fairly small, deep lake. It is located in a watershed that was predominantly forested, and harvested. Although numerous dwellings surrounded the lake, most appeared to be seasonal cottages. Fertilizers were apparently used on yards bordering the lake, and no significant buffer protected the shoreline. Hypolimnetic anoxia, apparent in Lake McMurray particularly later in the summer, caused internal nutrient loading in which nutrients are released from the sediment into the water column. Anoxia also led to the formation of hydrogen sulfide, which caused the distinct, “rotten-egg” smell noted in September. The lake appeared to be in good condition and supported primary uses. Fortunately, nutrient loading had not yet led to extraordinarily dense algal blooms. The aggressive noxious weed, Eurasian watermilfoil (Myriophyllum spicatum), dominated the submerged plant community in the lake and elicited complaints. Lake McMurray underwent a whole lake Sonar treatment for the eradication of Eurasian watermilfoil during the summer of 2000. It will be interesting to observe the algae response to this treatment.

Uses of the lake, as indicated by questionnaires as well as site visits, consisted primarily of fishing, in addition to some canoeing, kayaking, and watching wildlife. The lake additionally served as habitat for eagles. WDFW managed the fishery primarily for rainbow trout. About 15,000 - 18,000 catchable trout were planted each April in preparation for opening day. Native anadromous cutthroat trout and coho salmon also used the lake, and spawned in its tributary inlet. Warmwater fish species present included large- and smallmouth bass, black crappie, and yellow perch. The fishing season was open from the last Saturday in April through October, and the lake was visited by about 5000 anglers on opening day alone.

Despite possible internal nutrient loading, the lake’s water quality supported primary uses. Therefore, we recommend a total phosphorus criterion of 25.8 ug/L (mean 21.5 ug/L plus standard deviation of 4.3 ug/L).

Mean Secchi = 4.5m (N); Mean TP = 21.5 ug/L; Mean Chl = 4.2 ug/L

[a] TSI Qualifiers: B or W-Secchi Disk hit bottow or entered weeds; J-Estimate; N-Fewer than the required number of samples

[b] E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

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Date	Time	Strata	Tot P (ug/L	Tot N (mg/L)	TN:TP	Chloro-phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/9/1999		L					3			
		L					3			
8/9/1999		L					5			
		L					6			
9/8/1999		L					3			
		L					1			
Station 1										
6/9/1999		E	22	.886	40	4.9		28.2	6690	.7
		H	31.8	.933	29					
7/15/1999		E	23.6	.793	34	3.15				.6
		H	27.3	.958	35					
8/9/1999		E	19.7	.639	32	4.9				1.2
		H	29.4	.77	26					
9/8/1999		E	20.8	.491	24	3.8				.8
		H	61	.604	10					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Watershed Survey

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Survey Date: 9/8/1999

Land Uses (1 = Primary, 2 = Secondary, etc.)

- [3] **Agriculture(commercial, not hobby)**
- [ ] **Commercial, Industrial**
- [ ] **Major transportation**
- [1] **Residential**
- [2] **Park, forest or natural**

Impervious surfaces (Roads and parking area): No Curbs

Observations (check mark denotes presence)

BMP's ☑

Lack of strong buffer zones. Looks as if fertilization of lawns is occurring. Other than that, very positive. One non-natural shoreline.

Odors ☐

None noted.

Cattle ☐ **Ducks** ☐ **Geese** ☐

None seen.

Fertilizers and weed killers appear to be used in residential or agriculture area ☑

Residential lawn fertilizing on yards bordering lake.

Buffer zones around streams and wetlands ☐

Most homes have a few cattails, however, for the most part, the buffer zones are poor at best.

Irrigation ☐

None noted

Survey Id: 1

Habitat Survey Summary Report

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Data are averages of ***10*** **Stations Surveyed** **Date of Visit:** 8/3/1999

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg:	2.4	**Number of stations with canopy:**	9
Understory Avg:	2.8	**Number of stations with understory:**	9

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer:	**trees > 0.3 m DBH**	2.1
	trees< 0.3 m DBH	1.9
Understory:	**woody shrubs _saplings**	2.6
	tall herbs, forbs _grasses	1.2
Ground Cover:	**woody shrubs _seedlings**	2.0
	herbs, forbs, _grasses	3.0
	standing water or inundated veg	0.1
	barren or buildings	0.7
Substrate Type (within shoreline plot):	**bedrock**	0.0
	boulders	0.4
	cobble/gravel	0.7
	loose sand	0.2
	other fine soil/sediment	0.0
	vegetated	3.6
	other	0.2
Bank Features:	**angle (O:<30; 1: 30-75; 2:nr vertical)**	0.9
	vertical dist (M from wtrln to high wt):	0.1
	horiz. dist. (M from wtrln to high wt):	0.0

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	0.6
commercial	0.0
park facilities	0.2
docks/boats	1.0

walls, dikes, or revetments	0.2
litter, trash dump, or landfill	0.0
roads or railroad	0.1
row crops	0.0
pasture or hayfield	0.0
orchard	0.0
lawn	0.9
other	0.0

Physical Habitat Characteristics

station depth (m; at 10 m from shore)	3.8

Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.0
boulders	0.2
cobble	0.5
gravel	1.0
sand	1.9
silt	2.0
woody debris	1.1

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	1.5
emergent	0.7
floating	1.2
total weed cover	2.0
Do macrophytes extend lakeward (-1 = yes, 0 = no)	-0.4

Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.6
snags	0.0
brush or woody debris	0.4
inundated live trees	0.1
overhanging vegetation	1.2
rock ledges or sharp dropoffs	0.4
boulders	0.2
human structures	0.5

Questionnaire

MCMURRAY

Results compiled from 5 **Surveys.** **Average time (years) respondents spent on lake:** 13.00

Did the following add (+1), detract (-1), or have no effect (0) on your enjoyment of the lake today?

Types of WaterCraft:	0.2	View:	0.8	Distance to Lake:	0.5
Public Access:	0.8	Swim Beach:	0.4	Canada Geese:	0.3
Water Clarity:	0.4	Water Qual. for Swim:	0.4		

Water Clarity:	0.4	Water Qual. for Swim:	0.4
Fishing Quality:	1.0	Aquatic Plants:	-0.5

On a scale of 1 (poor) to 5 (excellent), how would you rate water quality today? **3.2**

Which would you rather have, 1 or 2?

1) Better fishing and more natural habitat, or 2) clearer water?	1.2
1) Better fishing and more natural habitat, or 2) fewer aquatic plants?	1.0
1) Clearer water, or 2) fewer aquatic plants?	1.2

How important is each of the following characteristics to you (1 = very undesirable, 5= very desirable):

Restricted Watercraft:	4.2	Good Warmwtr Fishing:	3.0	Natural Scenery:	4.4
Plant Growth:	2.6	Good Swimming:	3.6	Public Beach:	3.0
Natural Shoreline:	4.0	Less Algae:	4.0	Canada Geese:	3.4
No Odors:	4.4	Public Access:	4.2		
Good Coldwtr Fishing:	4.4	Clear Water:	4.5		

Tabulated Results

Survey ID	Date	Residency		Rent or Own	Primary Activity*	Water Clarity: Purchase Factor?	Water Clarity: Has it Changed?	Water Clarity: When?
104	9/9/1999	Resident	Permanent	Rent	7	☐	Worse	1994
	Noise level is too high from guns and dirt bikes.							
110	9/14/1999	Resident	Permanent	Rent	1	☐	Worse	1995
145	6/9/1999	Visitor			2	☐	No	
146	6/9/1999	Visitor			2	☐	Worse	
149	9/3/1999	Visitor			2	☐	Unknown	

* 1=canoe/kayak, 2=fish, 3=pers. wtrcrft, 4=mtrboat, 5=sail, 6=swim/wade, 7=watch wldlf, 8=ski, 9=windsurf, 10=relaxing

Zooplankton Report

MCMSK1

Date 6/9/1999 Station: 1 Sample ID 83

Length of tow not labelled. Extremely dense algae, difficult to ID.

Number of organisms measured: #Delet

Group	Percent	Group	Percent
Cladocera	#Deleted	Small < 1mm	#Deleted
Copepod	#Deleted	Large >= 1mm	#Deleted
Other	#Deleted	Ratio of large to Smal	#Num!
		Average size (mm):	0.52

Date 8/9/1999 Station: 1 Sample ID 44

Length of tow and site number not labelled

Number of organisms measured: #Delet

Group	Percent	Group	Percent
Cladocera	#Deleted	Small < 1mm	#Deleted
Copepod	#Deleted	Large >= 1mm	#Deleted
Other	#Deleted	Ratio of large to Smal	#Num!
		Average size (mm):	0.58

Aquatic Plant Data

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Sampler: Parsons, O'Neal

Survey Date: 8/3/1999

Max depth of growth (M): 4

Comments Partly cloudy, breezy, thunderstorm--too much lightening to get a secchi. Thunderstorm impeded progress. Milfoil still thickest near boat launch area, not surfacing, but looking healthy. Did habitat survey

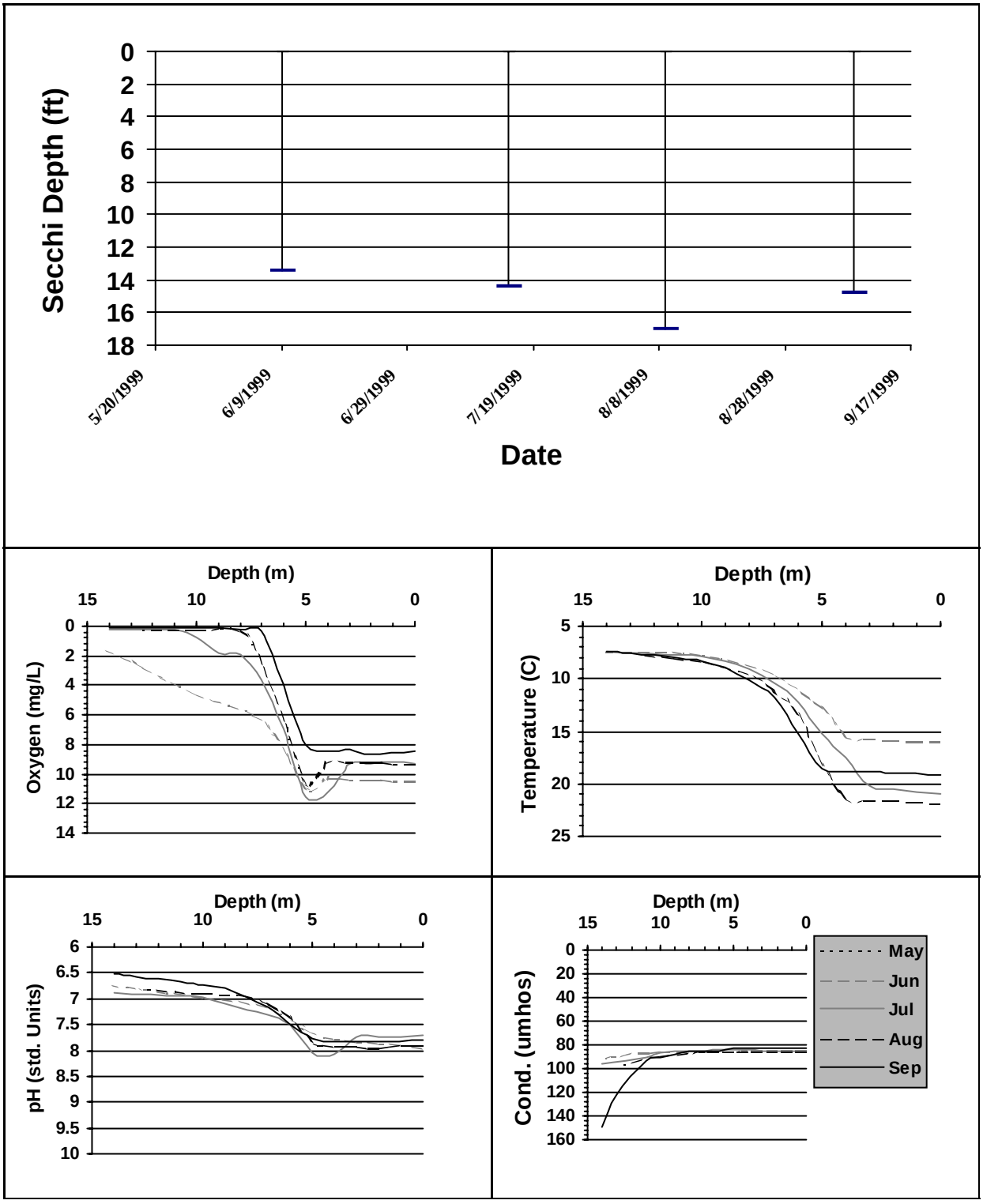
SPECIES LIST

Scientific Name	Common Name	Dist [a]	Comments
Ceratophyllum demersum	Coontail; hornwort	1	
Elodea canadensis	common elodea	2	
Iris pseudacorus	yellow flag	2	
Juncus sp.	rush	2	
Myriophyllum spicatum	Eurasian water-milfoil	3	not surfacing
Najas flexilis	common naiad	2	
Nitella sp.	stonewort	1	
Nymphaea odorata	fragrant waterlily	3	pink and white, dense where there is habitat
Potamogeton epihydrus	ribbonleaf pondweed	1	couple of patches, very robust
Potamogeton sp (thin leaved)	thin leaved pondweed	2	
Typha latifolia	common cat-tail	2	

[a] 0 - value not recorded (plant may not be submersed)
1 - few plants in only 1 or a few locations
2 - few plants, but with a wide patchy distribution
3 - plants in large patches, codominant with other plants
4 - plants in nearly monospecific patches, dominant
5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1 MCMSK1



Secchi Data and Field Observations

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Date	Time	Temp-erature (F)	Secchi (ft)	Color (1-greens, 11-browns	Bright-ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
Station 1													
6/9/1999			13.45	2	100	3	1	5	5	18	0	3	0
	Sampler: SMITH			Remarks: None. Dissolved oxygen measurement qualified as an estimate due to calibration failing QA/QC requirements.									
7/15/1999			14.44	2	50	3	1	5	5	0	0	2	0
	Sampler: SMITH			Remarks: Abundant Eurasian milfoil									
8/9/1999			17.06	2	100	1	1	5	3	0	0	2	0
	Sampler: SMITH			Remarks: 1 bald eagle. Fec #1 taken in front of smallest cabin close to water approx. 200 meters west of boat launch. Fec #2 taken at boat launch.									
9/8/1999			14.76	2	0	1	1	4	1	0	0	2	0
	Sampler: SMITH			Remarks: Milfoil thick in places, especially near boat launch. A slight blue-green bloom. H2S odor at 13 meters. Fec #1 at Sons of Norway. Fec #2 at boat launch.									